Academic Year/course: 2022/23

26813 - Statistical Methods for Optics and Optometry

Syllabus Information

Academic Year: 2022/23
Subject: 26813 - Statistical Methods for Optics and Optometry
Faculty / School: 100 - Facultad de Ciencias
Degree: 297 - Degree in Optics and Optometry
ECTS: 6.0
Year: 2
Semester: Second semester
Subject Type: Basic Education
Module:

1. General information

2. Learning goals

2.1. Competences

On completion of the module the student should be able to:
- tabulate, display and summarize sets of data,
- understand the basic concepts of probability,
- be able to calculate probabilities for simple experiments recognize random variables in real cases,
- solve estimation problems and construct confidence intervals,
- perform parametric and non parametric test and taking decisions, and
- fit simple linear models.

3. Assessment (1st and 2nd call)

4. Methodology, learning tasks, syllabus and resources

4.1. Methodological overview

Professors will provide sufficient material of interest in order that the student can find real (or close to real) applications of statistics.

Ongoing work will be motivated.

Lecture sessions with the whole group in which the main concepts will be presented, together with some problems in which these concepts will be applied.

Into the previous lecture sessions the main difficulties arising to the students in the resolution of the problems and questions proposed will be discussed, trying to detect the main errors in the resolutions, as well as which questions have been solved satisfactorily.

Practical classes with few students, developed in computer labs, to analyze data coming from real problems, as well as simulation studies, in order that the student can understand the basic properties explained (without proof) in the lecture sessions.

Tutorial sessions to discuss issues concerning difficulties in the learning process, to correct ways of working, to monitorize the practical work assigned to the student, etc…

4.2. Learning tasks

Two hours per week of lectures with the whole group. The students will be provided previously with lecture notes with the main concepts and simple illustrative examples.

Two hours per week of practical sessions in computer lab. The students will be provided previously with scripts and lists of problems to be solved in these sessions.

Individual coaching, personal study and work.

4.3. Syllabus

The thematic parts of the subject are the following:

Part 1. (5 weeks) Introduction to Statistics. Types of studies, of data, of posible variables. Descriptive numerical and graphical analysis of a statistical variable. Bivariate analysis: Independence-association, correlation, regression.

Part 2. (4 weeks) . Games of chance. Probability and basic rules. Conditional probability and independence. Probabilistic models. Random variables and vectors. Characterization of their probability distribution. Law of large numbers and Central Limit Theorem. Discrete and continuous models more relevant.

Part 3. (6 weeks) Population and sample. Random sample. Statistical model for a data set. Point and interval estimation of parameters. Hypothesis testing. Comparisons of two groups: t tests and Rank tests. Inference with categorical data. Computation of sampling size

4.4. Course planning and calendar

The Schedule of lectures and practical sessions will be previously announced in the web page of the

faculty, as well as the web page of the course.

The exam date will be previously announced through the web page of the course.

4.5. Bibliography and recommended resources

http://psfunizar10.unizar.es/br13/egAsignaturas.php?codigo=26813